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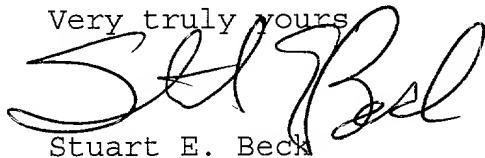
Assistant Commissioner of  
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Re: U.S. patent application entitled:  
EXERCISING AND SPORTS CONDITIONING MAT

Dear Sir:

Enclosed for filing at the Patent and Trademark Office are the documents described below.

Kindly credit any overpayment or charge any underpayment of the fee to my deposit Account No. 02-1652. A duplicate copy of this letter is enclosed.

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## EXERCISING AND SPORTS CONDITIONING MAT

### Field of the invention:

This invention relates to a mat, and more particularly to a mat which is especially suitable for exercising and sports conditioning programs that include jumping.

### Background of the invention:

People who participate in exercise and sports conditioning programs that include a substantial amount of jumping are at substantial risk of injuring themselves because the impact of landing is fully absorbed by the body due to improper surfaces.

Further, they often fail to obtain the full benefits of such programs and expose themselves to risk of further injury if they do not perform the jumping routines properly. Thus, when a particular exercise or conditioning routine includes a particular sequence of steps or a particular foot positioning or spacing, a correct performance of the routine will contribute toward maximizing its benefit while minimizing the likelihood of injury.

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Fatigue is not harmful and in some cases may be beneficial since it indicates the muscles are tiring. However, premature fatigue should be avoided so that the routines are done correctly and maximum benefit of the jumping exercise can be achieved.

These problems are aggravated by those programs which include rapid and repeated bursts of jumping. Thus, even a well-conditioned person's body may absorb the impact of repeated landings causing risk of injury or fatigue. Further, the problem of correct performance of the routines becomes even more difficult as the speeds at which the repetitions are performed increase.

Jump training which is a form of conditioning includes jumping and landing. It also involves the need to suppress motion, such as when plyometric movements such as hops and jumps are followed by pauses and holds in the landing position.

In jump training, successful performances of the jumping-type movements require that the integrity of spinal and body alignment be maintained throughout the jump so that proper neuromuscular reaction is facilitated and injury is prevented. Generally, the correct position when jumping requires that the angle of flexion of the legs be about one-quarter squat. However, for sport specific workouts, flexion of the legs up to ninety degrees may be appropriate for trained athletes.

In jump training, the landing is an eccentric muscle contraction and should be controlled and soft. This helps distribute the force of impact. Landings are light, including decelerating against momentum and gravity, keeping the abdominal muscles taut and the knees slightly bent. The landing includes, first touching on the balls of the feet, then "melting down," which includes rolling onto the heels before making the next movement. Landing on flat feet is avoided.

Unfortunately, a suitable surface on which to perform jump training and exercise and sports conditioning programs that include jumping, was not known in the prior art.

Summary of the invention:

With the foregoing in mind, the invention relates to an exercising and sports conditioning mat which comprises a plurality of stacked layers including a lowermost layer having a bottom surface for interfacing with the surface on which the mat is placed, an intermediate layer comprising an impact absorbing material, and a top layer. The top layer includes a top surface on which the exercising and sports conditioning are done.

In another aspect the invention relates to a plurality of indicia which are supported by the top surface and which assist the user with body placement while using the mat.

Brief description of the drawings:

Figure 1 is a top view of a mat constructed in accordance with a presently preferred embodiment of the invention;

Figure 2 is a side view of the mat shown in Figure 1; and

Figure 3 is a side exploded view of the mat shown in Figure 1.

Figure 4 is a top view of another embodiment of the mat shown in Figure 1.

Figure 5 is a top view of the a plurality of the mats shown in Figures 1 and 2 arranged as for use by an instructor and two students.

Detailed description of the preferred embodiments:

In Figures 1 and 2 there is shown a preferred embodiment of the exercising and sports conditioning mat 10 of the invention.

The mat 10 may be of any size that can accommodate at least one exerciser, regardless of the exerciser's height and weight. For the average exerciser, the mat 10 preferably is a forty-two-inch-square. However, the mat 10 can be of a size to accommodate more than one user.

In a preferred embodiment, the mat 10 is relatively light weight and thin in comparison to existent mats while providing sufficient cushioning when the exerciser lands to absorb the landing impact while at the same time resisting the tendency of the ankle and/or leg joints of the exerciser to turn on landing.

Thus, it is preferred that the mat 10 weigh in the range of about 4.5 to 5.5 pounds and its height be only slightly more than about 0.5 inches. It is to be understood, however, that the mat can be as thin as about 0.25 inches and as thick as about two inches and the weight of the mat can be as light as about three pounds and as heavy as about ten pounds.

Referring now to Figure 2, the mat 10 comprises a stack of layers which includes a top layer 12, an intermediate shock absorbing layer 14 and a bottom layer 16. The mat is made of materials that interact to absorb the stresses due to impact during exercise and sports training, while providing a multipurpose, non-slip surface on which the user performs routines and an anti-slip bottom surface that prevents the mat from sliding.

The top layer 12 is positioned on top of the intermediate layer of shock absorbing material 14. It includes a top surface 20. The exercising and sports conditioning are performed on top surface 20. Therefore, the top layer 12 is made of a material on which the exerciser can move about and jump without fear of slipping, and which facilitates exercise movements, such as pivoting, jumping, sliding and running.

The intermediate shock absorbing layer 14, which is located between the top layer 12 and the bottom layer 16, comprises a shock absorbing and anti-fatigue material. The material comprising the intermediate shock absorbing layer 14 absorbs and dissipates the energy of the exercise, or the impact of the body

of the user on the mat. The intermediate layer of shock absorbing material 14 reduces stress to the muscles, joints, tendons and ligaments on the body of the exerciser associated with landings and/or other impact with the mat 10 and is similarly anti-fatiguing.

In addition, the intermediate shock absorbing layer 14 is made of a material that has a quick recovery memory. This enables it to return to its unloaded state even during rapid repetitions of jumping routines. This is especially important since its effectiveness as a support is not diminished by rapid and repeated high impact exercises such as jumps.

The bottom layer 16 includes a bottom surface 24 which lies on and is an interface between the intermediate shock absorbing layer 14 and the surface 28 upon which the mat is placed. Typically, the surface 28 is the wood, vinyl or linoleum floor of a designated work-out space.

The bottom surface 24 prevents the mat 10 from slipping while it is being used. This is especially important since if the landing is at an angle relative to the vertical, the landing force will include a lateral component in addition to the normally expected vertical component. This lateral component will tend to urge the mat sideways across the surface 28. The consequences of the mat moving sideways during a landing will be disastrous since without support, the exerciser will fall with the attendant risk of serious injury.

Additionally, while not critical to the performance of the routines it is preferred that the bottom surface 24 comprise a material that does not leave marks on the surface 28.

As seen in Figure 3 the bottom layer 16 is attached to the intermediate shock absorbing layer 14 by a suitable adhesive such as a hot melt adhesive 32. The intermediate shock absorbing layer 14 is attached to the top layer 12 by a similar adhesive 34 such as the hot melt adhesive just described.

The top layer 12 preferably comprises a polyvinyl resin such as polyvinyl chloride which is typically referred to as sheet vinyl having a thickness in the range of between 1/30-inch and about one half inch. The sheet vinyl is chosen so that it generates enough friction during exercising to prevent unwanted slipping while permitting unimpeded foot movement when desired. Further, the sheet vinyl must have strong wearing characteristics to resist damage after use over extended periods while at the same time being non-porous and pliable.

Since the top layer 12 of the mat 10 is non-porous and impermeable to liquids, it is easy to clean and liquids that may fall onto the surface 20 and contribute to dangerous slips and falls, such as perspiration, liquid drinks and the like, may be easily wiped off the top surface 20 without fear that they will invade the mat and damage the intermediate shock absorbing layer 14. Further, its pliability simplifies its storage during non-use since it can be rolled into a tight cylindrical shape. Sheet

vinyl of the type preferred for the top layer 12 is made by the Geon Engineered Films Group of Winchester, Virginia. It is sold under the name 1Q SERIES.

A particularly suitable material for achieving the purposes of the intermediate shock absorbing layer 14 is a closed cell elastomeric foam such as nitrile butadiene rubber/vinyl-nitrile (NBR/PVC) elastomeric foam which is of the type referred to as ENSOLITE AG1, AG2, AGC, FBC, IV1, IV2, IV5, IVC, GIC, MLC-BLACK, manufactured by Rubatex Corp. of Roanoke, Virginia.

The anti-slip function of the bottom surface 24 is preferably achieved by making the bottom layer 16 from a plasticized vinyl coated scrim, which can be of the type referred to as SLIPNOT, WICKER LOC, HOLD TIGHT, RUG SAFE, SULTAN, SCOOT-GART, MIGHTY GRIPPER, MEDIGRIP, MEDIMAT, RUG SAVER AND SOFT GRIP, supplied by Vantage Industries, Inc. of Atlanta, Georgia.

The hot melt web adhesive 32 and 34 can be of the type referred to as BOSTIK WEB PE75, manufactured by Bostik, Inc. of Middleton, MA.

As best seen in Figure 1 the top surface 20 of the top layer 12 comprises a first plurality of elements 38 and a first plurality of mutually distinctive components 40 that cooperate with each other and with the layers 12, 14 and 16 comprising the mat 10 to help assure that foot placement for the routines for

which the mat 10 is especially suited are performed correctly and with minimum likelihood of injury.

The first plurality of elements 38 and first plurality of mutually distinctive components 40 are arranged in an eye pleasing design 42 without detracting from their purpose of providing guides for foot placement.

A critical aspect of the arrangement of the first plurality of elements 38 is to establish preferred minimum distances for foot placement which distances cooperate with the arrangement of the layers 12, 14 and 16 of the mat 10 to maximize the benefit of the routines while minimizing the likelihood of injury.

Similarly, the first plurality of mutually distinctive components 40 are arranged to establish a preferred order of foot movement on the mat 10 so that even though routines are done at a rapid rate, there need not be any fear the routine will be performed in an improper manner, or that a foot will slip on the mat 10, or that the mat 10 will slide from under the exerciser.

A preferred configuration for the first plurality of elements 38 is a geometric figure such as the outer rectangular polygon 44.

The outer rectangular polygon 44 is especially suitable for accomplishing the purposes of the invention since its rear and front ends 52 and 56 and its sides 50 and 54 can establish

minimum distances while placement of the first plurality of components at predetermined locations relative to the outer rectangular polygon 44 can establish the preferred order of foot movement.

Further, if the length of lateral sides 50 and 54 that define the distance between the rear and front ends 52 and 56 of the outer rectangular polygon 44 are different from the length of the sides 52 and 54, the minimum distances for side to side foot placement will be different from the minimum distances for foot placement.

However, if the outer rectangular polygon 44 is a square, then the minimum distances for foot placement from side to side will be the same as the minimum distances from front end to rear end.

Advantageously, the outer rectangular polygon contains within its perimeter a second inner rectangular polygon 60 of substantially identical proportions. The space 66 between the rectangular polygons 44 and 60 may define the sides 70, 72, 74 and 76 of both polygons 44 and 60. Preferably, the distance between the rectangular polygons 44 and 60 is somewhat less than the width of an exerciser's foot.

Experiments have indicated that for an exerciser of average height, the best results are achieved if the minimum distance

across the outer dimensions of the outer rectangular polygon 44 is about eighteen inches.

Further, as explained above the distance between the inner and outer rectangular polygons 44 and 60 can be somewhat less than the width of an exerciser's foot, i.e., about two to four inches. The provision of a space between the inner and outer rectangular polygons offers significant advantages to the exerciser. Thus, foot placement, in addition to being to the outside of the rectangular polygon 44, can also be on the sides 70, 72, 74 and 76, and still further can be along the inside of the sides, i.e., on the second inner rectangular polygon 60. Since the sides are about the width of an exerciser's foot, the resulting change in foot position will be about twice that since the position of the feet on both sides of the rectangular polygons 44 and 60 will be similarly positioned.

This has the advantage of enabling a routine to be varied for increased benefit by varying foot placement from on the second inner rectangular polygon 60, to between the polygons 44 and 60 and to the outside of the outer rectangular polygon 44.

Still further, since the sides 70, 72, 74 and 76 are relatively wide, exercisers of different heights can be accommodated with the shorter exercisers using the inner rectangular polygon 60 and sides while taller exercisers use the outer rectangular polygon 44 and sides.

The second plurality of components 40 comprises the plurality of mutually distinctive components 92, 94, 96 and 98 that correspond to preferred foot placement during exercise routines. The mutually distinctive components 92, 94, 96 and 98 cooperate with the inner and outer rectangular polygons 44 and 60 and the arrangement of the layers 12, 14 and 16 of the mat 10 to further enhance its effectiveness as a useful and beneficial device for exercising and sports conditioning.

Preferably four mutually distinctive components 90, 92, 94 and 96 are provided with one of the mutually distinctive components being located at each corner 100, 102, 104 and 106 of the rectangular polygon. While it is not critical to operation of the mat 10, it is preferred the components over-lie or be adjacent the corners 100, 102, 104 and 106.

The mutually distinctive components 90, 92, 94 and 96 can comprise any suitable material, structure or characteristic that enables them to be distinctive while not interfering with foot movement or placement. They are preferably arranged to coincide with a stepping or hopping exercise routine.

Typically, the components can be numbers, letters, shapes, colors or any other convenient items. They can be permanently applied to the corners by applique, paint, ink, branding or the like.

As best seen in Figure 1 the components 90, 92, 94 and 96 comprise indicia such as alphanumeric characters including numbers and letters. The arrangement of the alphanumeric characters is beneficial in helping the mat 10 accomplish its intended purpose by being arranged to correspond to a preferred order of foot placement during certain exercise routines that require stepping, hopping, jumping, or the like.

Thus, it is preferred that when numbers are used, they are arranged, starting from corner 100 in a counter-clockwise direction as "1," "2," "4" and "3."

This arrangement helps the exerciser since the numbers 1 and 2 are on adjacent left and right corners 100 and 102 at the rear 120 of the mat 10 for the feet of the exerciser to be side by side while the numbers 3 and 4 are on adjacent left and right corners 106 and 104 on the opposite side of the rectangular polygons 44 and 60 which is the front 124 of the mat 10 so that when the exerciser is on the other side of the rectangular polygons, the feet of the exerciser may also be side by side. It should be understood that the terms "rear 120" and "front 124" are used merely to distinguish one side of mat 120 from the other for the purpose of this description. Thus, it is clear that the designations could be reversed without departing from the spirit and scope of the invention.

In a like manner, the numbers "1" and "3" are on adjacent corners 100 and 106 on the left side of the rectangular polygons

44 and 60 (looking at Figure 1) while numbers "2" and "4" are on adjacent corners 102 and 104 on the right side of the rectangular polygons 44 and 60.

The impact of landing on the corners containing the distinctive components is absorbed by the intermediate shock absorbing layer 14. Further, the mat 10 is maintained on the surface 28 because of the interaction of the bottom surface 24 and the surface 28 to keep it from sliding.

Further, means are provided for emphasizing and highlighting the location and distinctiveness of the components 92, 94, 96 and 98 so that their distinctiveness is apparent during routines that contain rapid movements. In a preferred form, the components are contained within distinctive geometric shapes such as the circles 110, 112, 114 and 116. Still further, the components 92, 94, 96 and 98 and distinctive geometric shapes 110, 112, 114 and 116 may be provided with distinct and contrasting colors so that they are readily distinguishable from each other.

The mutually distinctive components 92, 94, 96 and 98 cooperate with the inner and outer rectangular polygons 44 and 60 to enable specific foot placement during routines. Further, since the components 92, 94, 96 and 98 are mutually distinctive, foot placement can be in a predetermined order. This is especially advantageous since the mat 10 can, with the mutually distinctive components and the rectangular polygons 44 and 60 be used for routines that include, but are not limited to, having

consistent exercises, performing to set standards, following choreographed routines, setting goals and the like.

Thus, as best seen in Figure 1, an exercise routine can begin with the feet at side by side on the corners 100 and 102 containing the distinctive components "1" and "2." The exercise routine may then require the exerciser to step or jump across the mat 10 to land on the corners 106 and 104 containing the distinctive components "3" and "4." The placement of the numbers "1" - "4" is especially advantageous since if followed in numerical order they commit the exerciser to a "left - right," "left - right" order of foot movement which coincides with a walking or marching rhythm.

Additionally, the exerciser can perform the routines without fear that the mat 10 will slide upon landing and with confidence that a landing impact will be absorbed and thereby minimize the likelihood of injury.

While rectangular polygons of particular size, and in particular, squares have been described as the presently preferred embodiment of the invention, it is to be understood that their size can vary depending on the purpose for which the mat 10 it is used and the height and conditioning of the exerciser.

Thus, for exercising and sports conditioning for advanced exercisers, or for tall users, the rectangular polygons 44 and

60 may be larger to create a larger area on which the limbs of the user must stretch or travel to complete the exercises. Conversely, for beginning exercisers, children or particularly short exercisers, the rectangular polygons 44 and 60 may be smaller to reduce the distance which the exerciser must stretch his or her limbs, jump, travel and the like.

In addition, an exercising and sports conditioning instructor can rely upon the mutually distinctive components 90, 92, 94, and 96 to enable use of the mat 10 to produce benefits including, but not limited to, identifying specific exercises, choreographing routines, monitoring the progress or skill level of exercisers, communicating with exercisers, and the like.

While the mat 10 is particularly suited for use in exercising and/or sports conditioning that includes jumping and especially for jump training, it can be used for any activity in which the feet of the exerciser leave and then return to the mat with force or in which the user's body touches the mat with force.

Uses include, but are not limited to, aerobics, parachute training, kick-boxing, and dance training; sports conditioning, including but not limited to, basketball, soccer, skiing, skating, karate, boxing, and track; and, floor work, including but not limited to resistance and flexibility training, yoga, and stress relaxation exercises. Further, the user may use weights while exercising on the mat 10 of the current invention.

In addition, the use of the mat 10 is particularly advantageous in a group fitness setting. The mat of the preferred size of 42 inches by 42 inches, defines each exerciser's space, reducing the risk of injury. Exercisers, separated by their individual mats 10 are less likely to come into physical contact with one another while exercising.

Additionally, the mat may be of any size which is suitable for one exerciser. However, it may large enough for more than one exerciser with a separate plurality of elements 38 and plurality of components 40 for each of the exercisers.

The separate plurality of elements 38 and plurality of components 40 for each of the exercisers are spaced so that they do not interfere with each other.

Referring to Figure 4, an embodiment of mat 10' which is suitable for an instructor is shown. The instructor's mat 10' is similar to mat 10 in its construction and like elements in mat 10' are identified by the same reference number as the corresponding reference number in mat 10, except the number is followed by a prime indicator, e.g., 12 and 12'.

As best seen in Figure 4 the mutually distinctive components 90', 92', 94' and 96' are the same as the mutually distinctive components 90, 92, 94, and 96 on mat 10 so that each of the components on mat 10 is repeated on mat 10'.

The arrangement of the distinctive components is beneficial in helping the mat 10' accomplish its intended purpose as an instructor's mat 10' by being arranged to correspond to the movement of the instructor's feet relative to the student's feet when the instructor is facing the student.

Thus, it is preferred that the instructor's mat 10' be arranged so that it coincides with the mat 10. However, the mutually distinctive component which are at the front end 124 of mat 10 are at the rear end 120' of mat 10' while the mutually distinctive components which are at the rear end 120 of mat 10 are at the front end 124' of mat 10'.

Further, when numbers are used, they are arranged similarly to the arrangement in mat 10'. Thus, starting from corner 100 in a clockwise direction the number are in the order "1," "2," "4" and "3."

From this arrangement it can be seen that when the mats 10 and 10' are placed "front 124-to-front 124'," (Figure 5), numbers "1" and "3" on both mats will be on the same side while numbers "2" and "4" on both mats will be on the opposite side.

Further, on the exerciser's mat 10, numbers "1" and "2" are on the rear 120 of the mat 10 while numbers "3" and "4" are on the front 124 of the mat 10. However, on the instructor's mat 10', numbers "1" and "2" are on the front 124' of the mat while numbers 3 and 4 are on the rear 120' of the mat 10'.

Thus, by comparing mats 10 and 10' in Figures 1 and 4 with the mats 10 and 10' in Figure 5, it can be seen that the mutually distinctive components are arranged on the mats so that repeated components are on the opposite sides of the mats when said mats are side by side (Figures 1 and 4), and are on the same side when the mats are facing, in matching end-to-end relation (Figure 5).

As best seen in Figure 5, the arrangement of mat 10' helps the instructor to give face-to-face instruction to exercisers. This is because when the mats are arranged for instruction, their fronts 124 and 124' will be facing each other.

Referring to Figure 5, the advantages of this arrangement of the mats 10 and 10' can be seen as when, for example an exercise routine is commenced with both the exerciser and the instructor standing with the left foot on "1" and the right foot on "2".

Thus, from the exerciser's point of view a foot step in the sequence "1," "2" will be matched by a movement of "1," "2" by the instructor. But while the exerciser is moving first the left foot and then the right foot, the instructor is moving first the right foot and then the left foot. None-the-less from the point of view of the exerciser, the instructor's foot movement is matching his own foot movement exactly.

Then, when the instructor issues a command to move the left foot to "3," the exerciser steps toward the instructor to obey

on mat 10. However, the exerciser will see the instructor move his right foot away from exerciser in a complementary movement, as in a dance step. Thus, during exercise routines, the exerciser will have the advantages of being able to follow the instructor's commands by referring to their own mat 10, while at the same time watching "same side" foot movement for side to side foot movement and "complementary" foot movement for front to rear foot movement.

A similar result is achieved when the mats are arranged with their rear ends 120 and 120' facing each other.

Thus, the instructor can call out to a class of exercisers a series of steps by identifying a desired sequence of alphanumeric characters "1" - "4". Then the instructor and exercisers can perform those steps. While performing the exercise, the exercisers watch the feet of the instructor while following the sequence without being distracted by the instructor moving the opposite feet.

Although preferred embodiments of the invention have been illustrated and described herein, it will be apparent to those skilled in the art that modifications, changes and substitutions may be made without departing from the spirit of the invention. It is intended that the appended claims cover all such variations as fall within spirit and scope of the invention.